भारतीय मानक
Indian Standard

IS 17191 (Part 2) : 2019

विद्युत पावर ट्रेन वाहन

भाग 2 रेंज मापने की विधि

Electric Power Train Vehicles

Part 2 Method of Measuring the Range

ICS 43.120

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

June 2019 **Price Group 2**

Electric and Hybrid Vehicles Sectional Committee, TED 27

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards after the draft finalized by the Electric and Hybrid Vehicles Sectional Committee and approval of the Transport Engineering Division Council.

This standard prescribes the requirements for the measurement of range of battery operated vehicles. In the formulation of this standard considerable assistance has been drawn from:

AIS 040 (Rev 1) : 2015 Electric Power Train Vehicles — Method of measuring the range

AIS 049 : 2016 Electric Power Train Vehicles — CMVR Type Approval for Electric Power Train Vehicles Central Motor Vehicles Rules, 1989 (as amended from time to time) Doc No MoRTH/ TAP/ CMVR - 115/116 (Issue no 4)

This standard incorporates corrigendum 1 issued to AIS 040 in December 2017.

In case of any variance between the standard and Central Motor Vehicles Rules, 1989 (as amended from time to time), latter shall prevail. Following document may be referred for latest update on statutory requirements related to Battery Operated Vehicles.

Central Motor Vehicles Rules, 1989 (as amended from time to time)

The composition of the committee responsible for the formulation of this standard is given at annex A.

In reporting the results of a test or analysis made in accordance with this standard, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

ELECTRIC POWER TRAIN VEHICLES

PART 2 METHOD OF MEASURING THE RANGE

1 SCOPE

This standard (Part 2) specifies the method for measurement of range expressed, in km for L, M and N categories of electric power train vehicles.

2 REFERENCES

IS No.	*Title*
14272 : 2011	Automotive vehicles — Types — Terminology
17192 (Part 1) : 2019	Electric power train vehicles: Part 1 Measurement of electrical energy consumption

3 DEFINITIONS

For the purpose of this standard the definitions given in IS 17192 (Part 1) in addition to definitions given in IS 14272 shall apply.

4 VEHICLE PREPARATION

Vehicle preparation shall be as per **4.0** of IS 17192 (Part 1).

5 CLIMATE CONDITION

All the tests are conducted at a temperature of between 20°C and 30°C.

NOTE — If the ambient condition cannot be met at the time of the test, then based on mutual agreement between test agency and vehicle manufacturer, requirement of ambient temperature condition can be waived.

6 TEST PROCEDURE

6.1 Test Sequence

6.1.1 The driving cycle shall be the Indian Driving Cycle (IDC) as given in Annex A of IS 17192 (Part 1) for all L category vehicles.

6.1.2 The driving cycle shall be Part 1 of the modified Indian driving cycle as given in Annex B of IS 17192 (Part 1) for M1, M2 (with GVW up to 3 500 kg) and N category of vehicles.

The driving cycle shall be Delhi driving cycle as given in Annex C of IS 17192 (Part 1) for M2 (with GVW above 3 500 kg) and M3 category of vehicles.

6.1.3 In cases where the vehicle does not reach the required acceleration during driving, the accelerator/speed control shall remain fully activated until the reference curve has been reached again

6.2 Power Setting of the Chassis Dynamometer

The procedure prescribed in the document MoRTH/TAP/CMVR-115/116 (issue no 4) as amended from time to time shall be adopted.

6.3 Test Method

6.3.1 *Principle*

The test method described hereafter permits to measure the range of the electric power train vehicles expressed, in km.

6.3.2 *Parameters, Units and Accuracy of Measurements*

Parameters, Units and Accuracy of Measurements Parameter	***Unit***	***Accuracy***	***Resolution***
Time	s	± 0.1 s	0.1 s
Distance	m	± 0.1 percent	1 m
Temperature	C	± 1 degree C	1 degree C
Speed	Km/h	± 1 percent	0.2 km/h
Mass	Kg	± 0.5 percent	1 kg
Electricity balance	Ah	± 0.5 percent	0.3 percent

Where accuracy is specified in percent, it is the percent off the measured value.

6.4 Operation Modes

The test method includes the following steps:

a) Initial charge of the rechargeable energy storage system (REESS); and
b) Application of the cycle and measurement of the range.

Between the steps, if the vehicle has to be moved, it is pushed to the following test area (without regenerative recharging).

6.4.1 *Initial Charge of the Rechargeable Energy Storage System (REESS)*

Charging the REESS consists of the following procedures:

NOTE — 'Initial charge of the REESS' applies to the first charge of the REESS, at the reception of the vehicle. In case of several combined tests or measurements, carried out consecutively, the first charge carried out shall be an 'initial charge of the REESS' and the following may be done in accordance with the 'normal overnight charge' procedure.

6.4.1.1 *Discharge of the rechargeable energy storage system (REESS)*

6.4.1.1.1 The procedure starts with the discharge of the REESS of the vehicle while driving (on the test track, on a chassis dynamometer, etc.) at a steady speed of 70 percent ± 5 percent from the maximum thirty minutes speed of the vehicle.

6.4.1.1.2 *Stopping the discharge occurs*:

a) When the vehicle is not able to run at 65 percent of the maximum thirty minutes speed;

b) when an indication to stop the vehicle is given to the driver by the standard onboard instrumentation; or

c) After covering the distance of 100 km.

6.4.1.2 *Application of a normal overnight charge*

The Rechargeable Energy Storage System (REESS) shall be charged according to the following procedure.

6.4.1.2.1 *Normal overnight charge procedure*

The charging is carried out:

a) With the on board charger if fitted;

b) With an external charger recommended by the manufacturer using the charging pattern prescribed for normal charging; and

c) In an ambient temperature comprised between 20°C and 30°C.

NOTE — If the ambient condition cannot be met at the time of the test, then based on mutual agreement between test agency and vehicle manufacturer, requirement of ambient temperature condition can be waived.

This procedure excludes all types of special charges that could be automatically or manually initiated like, for instance, the equalisation charges or the servicing charges. The manufacturer shall declare that during the test, a special charge procedure has not occurred.

6.4.1.2.2 *End of charge criteria*

The end of charge criteria corresponds to a charging time not exceeding twelve hours, except if a clear indication is given to the driver by the standard instrumentation that the REESS is not yet fully charged.

In this case,

The maximum time is =

$$\frac{3 \times \text{claimed battery capacity (Wh)}}{\text{mains power supply (W)}}$$

6.5 Application of the Cycle and Measurement of the Range

The test sequence shall be followed as per **5.1**.

The end of test criteria shall be when the vehicle is not able to meet the target curve up to 50 km/h (85 percent of the maximum speed of the driving cycle or 85 percent of the maximum speed of the vehicle for L category of vehicles only) or when an indicator from the standard on-board instrumentation is given to the driver to stop the vehicle.

Then the vehicle shall be slowed down to 5 km/h by deactivating the accelerator control, without touching the brake control and then stopped by braking.

When the vehicle does not reach the required acceleration or speed of the test cycle, the accelerator control shall remain fully activated until the reference curve has been reached again.

To respect human needs, up to three interruptions shall be permitted between test sequences of not more than 15 min in total.

At the end, measure D of the covered distance, in km is the electric range of the electric vehicle. It shall be rounded to nearest whole number.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Electric and Hybrid Vehicles Sectional Committee, TED 27

Organization	*Representative(s)*
International Centre for Automotive Technology (ICAT), Gurgaon	Shri Dinesh Tyagi (***Chairman***)
Ashok Leyland Ltd, Chennai	Shri Ravi M. Shrimati Suchismita C. (*Alternate*)
Association of State Road Transport Undertakings, New Delhi	Shri R Chandrababu Shri Ullas Babu (*Alternate*)
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Future Hi-Tech Batteries limited, Mohali	Ms Gagandeep Kaur Shri Gurvinder Singh Harjara (*Alternate*)
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Mahindra Research Valley, Chennai / Mahindra & Mahindra, Nasik	Shri Kumarprasad Telikepalli Shri Shailesh V Kulkarni (*Alternate*)

Organization	*Representative(s)*
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Scientist 'C' (TED), BIS

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices: *Telephones*

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002 — 2323 7617, 2323 3841

Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi
KOLKATA 700054 — 2337 8499, 2337 8561, 2337 8626, 2337 9120

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg
CHANDIGARH 160019 — 265 0206, 265 0290

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113 — 2254 1216, 2254 1442, 2254 2519, 2254 2315

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
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